

CO-RADS Guidance: Potential Options to Consider

Options to Consider	Value in Further Evaluation	Considerations
Blending with alternate source	High	Unavailable or likely already evaluated by system and determined to be infeasible, if not the case, systems should evaluate further
Consolidation with compliant system	High	Capital cost may be high, but long term O&M would be low. If available, should compare costs to CO-RADS Report option
Well rehabilitation using gamma ray logging of well strata	Moderate	Performing tests and rehabilitation of the well may be expensive and is not guaranteed to significantly reduce radionuclide concentrations. Additionally, this may adversely impact well production capabilities.
Proprietary solutions (Basin Water, WRT, FilterTech, etc)	High	Systems should consider obtaining a price quote from vendors to compare to CO-RADS Report Option. System should negotiate clear and acceptable contract terms.
Hydrous manganese oxide	Moderate	May provide some cost savings and help to reduce issues with iron removal, however, technical issues would need further evaluation, and likely require piloting. The rad build-up in media and worker exposure would need further evaluation.
Point-of-Use treatment	High	If a system can meet certain requirements, such as unit ownership, 100 % participation, residuals disposal requirements including ISDS discharge permitting, POU may provide significant cost savings.
Side stream blending around IX	High	May reduce treatment and waste disposal costs, however, system would need to ensure proper design and operation to maintain appropriate blend level after the treatment is in operation (e.g. media performance may decline over time)
Modular, expandable design (systems are sized at 20 year projected flows)	High	May reduce treatment and waste disposal costs, additional infrastructure to cover additional demand must be planned and paid for through other means such as tap fees.
Evaluate operator time and pay (report assumes .5 fte at 20 k/yr)	High	System may save on O&M costs if operator time can be reduced.
Reduce the amount of component redundancy (e.g. use only 1 pressure vessel for ion exchange)	Moderate	This may offer some capital savings by eliminating the cost of a equipment and potentially reducing the size of a treatment building. However, such design may not meet Design Criteria requirements and the system would have to request a deviation from any such criteria and would have to demonstrate the ability to maintain water supply during maintenance, media replacement, regeneration.
Alternate evaporation basin design	High	Concrete basins with secondary HDPE liner was indicated as a feasible alternative by the Residuals Management Workgroup, however, alternate designs such as a double HDPE or even clay and secondary HDPE liner may be acceptable and provide a cost savings. Systems should contact the Solid Waste Unit for further information on evaporation basin design requirements.

Regionalized treatment facility	High	If multiple systems are served by a single treatment facility, may provide for an economy of scale, which would reduce unit production costs.
Discharge to POTW headworks	Moderate	Must consider impacts to wastewater treatment plant performance, hydraulic capacity, or modifications to discharge or biosolids requirements. May not be able to meet discharge requirements or biosolids disposal costs may increase.
Discharge to POTW effluent	Low	Must consider modifications to discharge permit. May not be accepted by WQCD permits or system may not be able to meet discharge requirements.
Discharge to groundwater via infiltration or deep well injections	Low	May not be accepted by WQCD permits EPA Underground Injection Control Program, or system may not be able to meet discharge requirements.
Iron backwash decant recycle (could reduce evap basin size if feasible)	Moderate	If system can achieve sufficient settling in iron backwash, a recycle stream may allow for a reduction in evaporation basin sizing. Would need to consider impacts to treatment, increases in influent radionuclide and calcium, need for separate basins for IX and filter.
Iron filtration modifications will be required regardless of compliance option to reduce exposure and improve waste handling	High	Due to the accumulation of radium in waste sludge from iron removal processes, any system with co-occurring iron and radium will likely need to make modifications to the waste handling to meet regulatory requirements from WQCD Permits, HMWMD Solid Waste and Radiation Management Units.
Iron sequestration to eliminate iron filtration issues (not sure if feasible, but was suggested by vendor)	Low	Suggested by a treatment vendor, technical feasibility not proven, would require pilot testing to evaluate long term reliability.
Simultaneous iron removal in the IX to eliminate filtration issues	Low	Suggested by a treatment vendor, technical feasibility not proven, would require pilot testing to evaluate long term reliability.
Collective piloting (such as for HMO or Fe sequestration)	Moderate to Low	If multiple systems are considering a treatment option that will require piloting, and the source waters are similar, a single pilot study could be used to justify design for multiple systems, providing a cost savings to each system
Forming a special district to open up funding options	High	If a system cannot procure funds because it is not publicly owned, by forming a special district, it would create additional funding options. System must consider advantages and disadvantages of being a special district.
Use of interim measures to allow for pursuit of long term option	Unknown	WQCD is currently evaluating the acceptability of an approach that would allow a system to provide interim health protection measures under a compliance schedule which may allow for the use of a compliance option that will not be developed for a long period of time. Additional information regarding WQCD's acceptance of this approach is forth coming.